CHAPTER 5

REHABILITATION: TRACK, BRIDGES, AND TERMINALS

5-1. Definition and Application.

a. As used here, rehabilitation is work which falls between routine maintenance and new construction. It is often categorized as repair, minor construction, or a combination of the two. Rehabilitation involves restoring facilities to a "like new" condition and/or upgrading existing facilities to current design standards or installation requirements.

b. During the planning process, current and future installation requirements should first be clearly established. If subsequent investigations and analyses show that existing facilities could meet installation requirements through improving their condition and/or minor modifications, then rehabilitation is an appropriate option.

5-2. Installation Requirements and Facility Evaluation.

a. Installation traffic and load carrying requirements should be reviewed, as described in chapter 2. Then, structural and operational requirements should be checked according to the criteria in chapters 6, 7, and 8.

b. The purpose of evaluations should be to determine whether the track and facilities meet installation (mission) requirements, and if not, in what respect they are deficient. These determinations are made through condition, structural, and operational evaluations.

5-3. Condition Evaluation.

a. Level of Detail Required. Condition evaluations may occur in three stages or levels, depending on the size and scope of the project:

(1) At the first stage, a quick condition assessment may be appropriate, based on recent inspection reports and inventory information and a brief field survey. This assessment may be used to establish a general need for rehabilitation.

(2) The second stage may be an evaluation for developing a rehabilitation plan. This information will be sufficiently detailed to determine what work needs to be done at which locations, and to develop cost estimates for planning and budgeting purposes.

(3) At the third level, exact work requirements, quantities, and locations are determined for final contract plans and specifications.

b. Track.

(1) Track condition evaluation should be based on the criteria given in Army TM 5-628/AFJMAN 32-1048 as well as other major rehabilitation requirements. The evaluation should also allow for major deficiencies which are likely to occur within the next three to five years if rehabilitation is not performed.

(2) Current track deficiencies should be recorded on a field inspection log designed for routine maintenance requirements. All turnouts in the track intended for rehabilitation should receive a thorough inspection, including operating the points. The development of a sequence for the track inspection is important since it actually outlines the plan for inspection. A suggested inspection sequence would consider the main track first recording the condition and spacing of the ties; the rail weight, section and material type; track alignment; surface appearance as related to dirt and debris; and condition of guard rails. The turnouts would be next including the following items:

(a) Switch operation.
(b) Switch stand: point lock, lever latches, point gap, point condition, gage measurement just ahead of points.
(c) Connecting Rod (including bolt).
(d) Jam Nut.
(e) Switch Rods (including bolts).
(f) Switch Clips.
(g) Side Plates.
(h) Rail Braces.
(i) Heel: filler, bolts, joint and shoulder bars.
(j) Frog: point, top surface, bolts, gage at point, flangeway width and depth.
(k) Curved Closure Rails: gage at joints.
(l) Guard Rails: gage at guard check and face, flangeway width.

(3) If records of an internal rail inspection are more than three years old, a new inspection should be made before the rehabilitation plan is completed.

c. Bridges.

(1) Railroad rehabilitation plans will include a condition assessment of the bridges on any line to be rehabilitated. This assessment may come from the last annual inspection, if that inspection is less than 6 months old. Otherwise, a new condition
assessment will be done.

(2) If a triennial inspection is due within 6 months for any bridge on a line to be rehabilitated, the triennial inspection and load rating (per para 5-4) will be done as part of the rehabilitation plan.

(3) If the last annual inspection indicates any significant change in condition of a main bridge member since the previous load rating was done, at least the included span (or spans) of the bridge will be thoroughly inspected and load rated (per para 5-4) as part of the rehabilitation plan.

d. Terminal and Support Facilities. The condition of all terminal and support facilities should also be evaluated. This evaluation may be done and reported separately from the track evaluation.

5-4. Structural Evaluation.

a. To determine current load carrying capacity, a structural evaluation will be performed for all track, bridges, loading ramps, and other structures needed for railroad and terminal operations.

b. Track structural evaluation should be done using the computer program described in appendix C.

c. Bridges.

(1) The load-carrying capability of a railroad line is often determined by the design capacity and present condition of the bridges along the route.

(2) All bridges which have not been thoroughly inspected and load rated within the previous three years will be examined and rated by a practicing railroad bridge engineer. The rating will be done in accordance with the AREA manual for timber bridges, concrete bridges, and steel bridges.

(3) Most military railroad bridges are of conventional timber design, built to an E60 rating. If these bridges are in very good condition, this capacity is sufficient for typical military traffic levels, including handling of 140-ton heavy equipment flatcars.

(4) By the AREA rating guidelines, the inservice rating for bridges in very good condition may actually exceed their design rating.

(5) Additional material on bridge design ratings is found in paragraph 6-17.

5-5. Operational Evaluation.

a. To determine general suitability for mission requirements, an operational evaluation will be performed on track and facilities. This evaluation should begin with a check of track and facility capability as well as basic geometric requirements, including:

(1) Number of loading and service tracks, along with usable car capacity of each.

(2) Car capacity of storage, yard, and auxiliary tracks.

(3) Clearances.

(4) Loading ramp height, width, and ramp angle.

(5) Size of parking and staging areas.

(6) Size of storage buildings in terminal areas.

(7) Track geometry.

(8) Maximum track curvature.

(9) Minimum turnout size.

(10) Protection and visibility at road crossings.

b. For terminals, the adequacy of lighting, service roads, and security features should be evaluated.

c. For all track and facilities, adequacy of drainage should be checked.

d. Previous derailment sites and chronic problem areas should be included in the evaluation.

5-6. The Rehabilitation Plan.

a. Purpose and Content. The rehabilitation plan is used, in part, to justify the need for the recommended work. Thus, it should demonstrate a thoughtful analysis of the existing facilities combined with a clear understanding of mission requirements. The plan should include the following:

(1) Statement of installation (mission) requirements.

(2) Description of track and facilities and their current condition.

(3) Statement of deficiencies, based on condition, structural, and operational evaluations.

(4) A work plan of remedial actions to correct deficiencies, including an explanation of why the proposed actions were chosen over other alternatives.

(5) Cost estimates for each item in the work plan. Each of these items is discussed below. Appendix D contains an example track rehabilitation report; a similar format would also be used for bridges and terminal and support facilities. Appendix D presents realistic rehabilitation requirements and illustrates how track rehabilitation is commonly done. This plan, and particularly the sequential description of work, should be studied and used as a guide in preparing track rehabilitation plans.

b. Mission Requirements. These are the current and expected future needs for regular traffic, training exercises, and mobilization, including amount and type of cargo, number and type of railroad cars to be handled, and terminal and support facilities requirements.

c. Description of Rack, Bridges, and Facilities.

(1) This includes a written description of facilities and their condition, along with track maps and photographs.

(2) If not previously done, each track, bridge, and turnout should be assigned a unique number (or other designation). Each track should be marked with standard surveyor's stationing to help determine work and material quantities (from track lengths) and work locations, and to provide permanent reference location marks for future track inspections. In general, track stationing should start with 0+00 at the point of the switch where the track branches from the main track, or for a main track, at the point where government ownership begins (at the connection with the serving commercial carrier).

d. Deficiencies List and Analysis. This section should include a description of the major deficiencies found and an explanation of how these conditions interfere with, or prevent, the facilities from effectively supporting the required mission. As part of this explanation, a comparison of the existing facilities to recommended design criteria can be useful. Photographs should also be included to help document deficiencies.

e. Work Plan.

(1) The work plan includes a listing of recommended remedial actions for correcting deficiencies, along with a list of the intended work limits. This section of the rehabilitation plan should also clarify why these actions were chosen, and where appropriate, what advantages and benefits they have over other alternatives. As an example, when a structural analysis indicates the need for a heavier rail section, eliminating the lighter rail often allows the installation to standardize with only one or two rail sections, thus requiring fewer sections to be kept for maintenance requirements and perhaps eliminating a section for which joint bars (or additional pieces of rail) are hard to find.

(2) If the rehabilitation plan will also serve for final plans and contract specifications, then the work plan must include all details of work to be done.

(3) Where appropriate, plans should also allow for the elimination of unneeded track, the possibility of re-using track materials elsewhere within the installation (where traffic and structural requirements are lower), and the cost-effective sale, transfer (to another installation), or disposal of scrap and salvageable materials.

(4) For rehabilitation, track should be regaged if the existing gage is less than 56-1/4 inches or greater than 57 inches.

f. Cost Estimates. For plans for major rehabilitation, cost estimates are usually based on costing the major work items, with extra allowances for minor work at other locations and additional minor work within the major work locations or work categories. When the rehabilitation plan is done in one stage, the cost estimates must also serve for the contract plans and specifications. In this case, the cost estimate breakdown must be more detailed.

5-7. Final Plans and Specifications.

a. Detailed Work Plan. For final (contract) plans and specifications, all work must be spelled out in detail. If not previously done, thorough inspections should be conducted for all included facilities to assure correctness of work requirements, work locations, and work and material quantities.

b. Marking Parts lb Be Replaced. At this time, all ties, rail, joint bars, bridge members, and other components intended for replacement should be individually marked, as well as the limits for all work locations. When marking defective parts, especially ties, bridge members, switch points, and frogs, those items which are in marginal condition (less than three to five years additional life) should also be included (and marked) for replacement.

c. Top-of-Rail Profiles.

(1) When ballast is added to the track, and the track is to be raised by three or more inches, top-of-rail profiles (elevations along the top of the rail at 50 to 200 foot intervals) should be taken so the final surface can be checked. These profiles will also help in estimating ballast quantities; this is especially useful if existing track surface is poor, as many low areas will likely need to be raised more than average to restore a smooth final surface.

(2) Initial top-of-rail profiles may be useful for track along loading docks to ensure proper car floor height at the dock.

(3) Top-of-rail profiles should be taken wherever overhead clearances are tight.

d. Drainage Profiles and Cross Sections. Before final plans and estimates are made, ditch profiles and cross sections should be taken to determine final ditch gradients and check earthwork quantities. These profiles are also needed to specify the exact work to be done and to guide the contractor's work in the field.

e. Handling Scrap and Salvage Materials.

(1) Rehabilitation contracts and specifications should require that scrap rail and other track materials be neatly stacked and/or bundled in a designated storage area for later disposal. Likewise, salvageable rail and OTM should be separated by type and weight, stacked or containerized, and stored in a designated area for reuse by

the installation or shipment to another installation.

(2) If scrap materials are to be retained by the contractor, a cost credit for the amount of scrap should be received by the government. This cost credit should equal the fair scrap value less a small amount for handling and transporting the material.

5-8. Construction and On-Site Inspection.

a. Quality on-site inspection, during all remedial work, is an essential element for a successful track rehabilitation. While such inspection is certainly no substitute for professionaly done track work, it is an effective means of assuring that all work is, in fact, performed according to the contract specifications.

b. On-site inspection during rehabilitation work can discover deficiencies or errors which would be difficult to detect during a completion inspection, or expensive to correct if discovered only after work was completed. Such items include:

(1) Was all excess vegetation removed before ballast was unloaded?

(2) Where track in crossings was to be completely rebuilt, was the old ballast completely stripped?; was the subgrade properly graded?; was drainage fabric installed?; were all new ties installed?

(3) Did the track actually receive a full 3" raise (or were the rough spots just smoothed out)?

(4) Was every tie tamped; did each tie get 2 insertions by the tamper; did joint ties (on the joint side only) get an additional (third) insertion? Likewise, correcting the following items after the work has been done would be difficult, at best.

(5) Tie and ballast material not as specified in the contract.

(6) Old, fouled ballast in shoulders not fully plowed out before new ballast was unloaded.

(7) Culvert improperly positioned, or site not graded properly before culvert was installed.

(8) Defective concrete or insufficient reinforcing in loading ramp.

c. It is recommended that the work be inspected by the same people who did the design and specifications.